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## PORTABLE ANT-NESTS.

ADELE M. FIELDE.

Portable ant-nests, constructed by me in the summer of 1900, were described in BIOLOGICAL BULLETIN, No. 2 of Vol. II., which is now out of print. Improvements that have since been made in them, and their present use by myrmicologists in America, Europe and Africa, justify a new statement of the method of making them. I have now ants that have lived in them, without earth, for three years, in health and apparent contentment.

The floor of the nest is a pane of double-thick, transparent glass. This is laid upon very thick, white blotting paper, giving an elastic bed to the pane of glass and the best background for observation of the ants. The paper has just the area of the glass, but is not fastened thereto.

The outer walls of the nest are laid a quarter inch, or six millimeters, from the edge of the pane. They consist of two strips of double-thick glass, a half inch, or thirteen millimeters, wide, the one strip superimposed on the other. Both are held in place by crockery cement.<sup>1</sup> The wall is smoothly laid up, with no interstices where an ant may hide or escape.

The partitions are double the width of the wall, which they otherwise copy. At one end of every partition a space is left whereby the ants may pass from room to room. This passageway is covered by a thin celluloid film or a piece of mica. It is desirable that this covering be transparent, so that the passageway underneath it may be scanned from above, on lifting the end of the toweling which is to overlay it.

After the cement is well dried, the edge of the floor-pane and the outside of the walls are covered with a fabric impervious to light. Cloth serves better for this purpose than does paper, the edges of the nest being subject to much handling. Le Page's or

<sup>1</sup>The use of cement instead of glue was recommended by Dr. W. M. Wheeler. Diamond, Major's or any reliable kind may be used. I have merged in water, for two weeks, a nest constructed with Major's cement, without loosening its parts. The directions accompanying the selected cement should be followed

some other good liquid glue is used for securing the fabric upon the walls.

The walls and partitions are topped by Turkish toweling of a sleazy sort, folded over one layer of cotton wadding so that the edges of the strip of toweling meet in the center of the under side of the wadding. The wadding is cut to the same width as the wall or the partition. The toweling is just twice the width of the wadding, and its edges are basted evenly together, making a cushion of even thickness. It serves the double purpose of admitting air into the nest and of preventing the escape of the ants between the roof and its supports. It is held taut and is made level; is fitted snugly at the corners; exhibits no ravelings to afflict the ants; and is firmly glued to the glass beneath it. When a cushion becomes soiled by long use of the nest, the glue may be softened by soaking and the cushion may be removed and be replaced by a new one. The ends of the cushions are fringed out a half inch or more, and are left open so that the enclosed wadding may be adjusted to present a perfectly level surface.

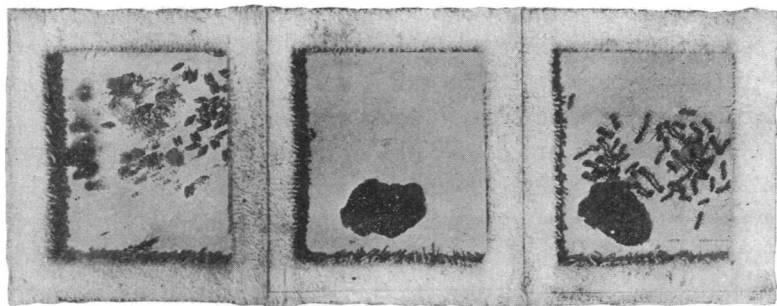
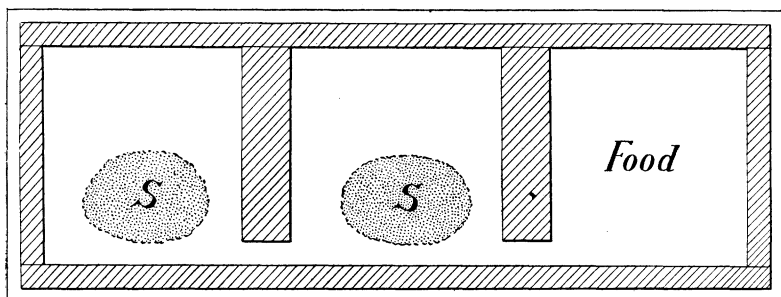


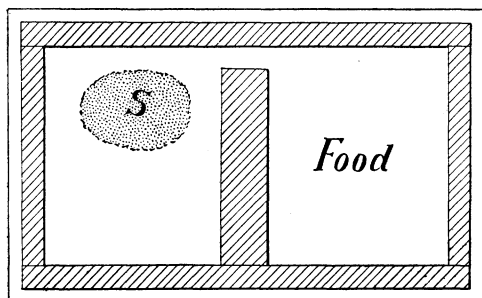
FIG. 2. The A nest completed.

There is a glass roof-pane for each room in the nest. The glass is thin; extends to the middle of the partition and to the outer edges of the walls on which it rests; prevents the exit of ants; and permits observation of their behavior. The glass may be without color, or it may be of a red or orange tint that will partially exclude ultra-violet rays of light. Ants perceive only such rays of light as are of short wave-length and, by use of a spectroscope, a glass roofing may be selected which renders the

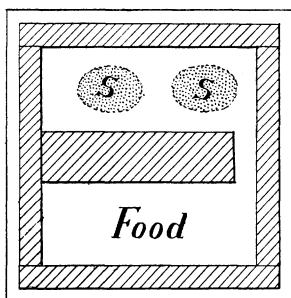
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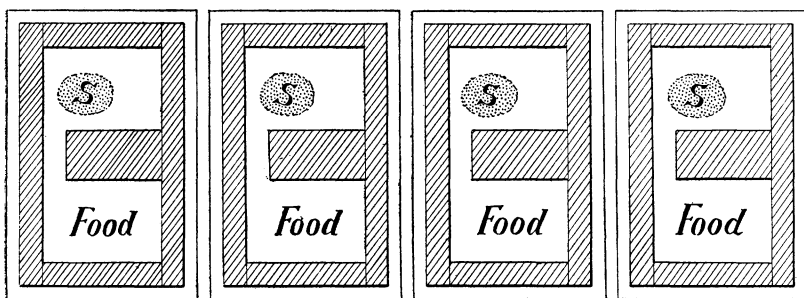
B



C



D



*Bases of Seven Ant-nests, Filling  
Three Shelves of Portable Case.*

ants visible within the nest while it protects them from such light-rays as they instinctively shun.<sup>1</sup> If such glass is used for roofing the nest, the ants will behave as if in the darkness where they habitually live.

An outer roofing of blotting-paper makes the interior of the nest wholly dark. The food-room should be light, as it represents the ant's outside world.

When any room in the nest requires cleaning, it is covered only with transparent glass, and then the ants withdraw from it with their young into a dark room, which may in its turn be made light.

The food-room is dry, and in cool weather requires attention but once a fortnight. Sponge-cake merged in a little honey or molasses, banana, apple, mashed walnut, and the muscular parts and larvæ of insects are among their favorite edibles. Food is constantly attainable in the nest, but it is introduced in tiny morsels that it may not vitiate the air.

Since moisture encourages the growth of mold, no water is put into the food-room. But ants often drink, and they require a humid atmosphere. All other rooms than that allotted to their food are made humid by laying a flake of sponge on the floor and keeping the sponge saturated with clean water dropped twice a week from a pipette. The proportion of the floor which is covered by the sponge depends on the degree of moisture in the soil usually chosen as the habitat of the species. The sponges are kept clean by weekly washing and an occasional immersion in alcohol. Sponges of fine tough texture render best service, as they offer no apertures where the ants may conceal their eggs. The flake of sponge is so thin as to permit the ants to pass between it and the roof-pane.

The completed nest is less than half an inch or thirteen millimeters in its interior height, and does not exceed three fourths of an inch or two centimeters in its exterior height. A low-power lens is easily focused upon the ants within the nest.

During four years of experimental work with ants, I have found that the nests whose bases are represented in the drawing

<sup>1</sup> "Supplementary Notes on an Ant," Adele M. Fielde, *Proceedings of the Academy of Natural Sciences of Philadelphia*, June, 1903, p. 492.

meet the requirements of the various species that I have desired to house for long periods.

A	is	$16\frac{1}{4}$	$\times$	6	inches	or	41	$\times$	15	centimeters.
B	"	10	$\times$	6	"		$25\frac{1}{2}$	$\times$	15	"
C	"	6	$\times$	6	"		15	$\times$	15	"
D	"	6	$\times$	4	"		15	$\times$	10	"

Nests of these dimensions fit into and fill a portable wooden case or box having an interior length of 17 inches or 43 centimeters; a width of 7 inches or 18 centimeters; and a height of  $4\frac{3}{4}$  inches or 12 centimeters. It is made of half-inch pine boards, dovetailed at the joinings. The interior of the case is equally divided lengthwise into four compartments by three shelves that are supported in grooves cut in the end-pieces of the case. The shelves are a quarter inch or six millimeters thick, and they leave space at their outer edge for the inset of a door which forms the front of the case, is hung by hinges at the bottom, and is held shut by two buttons affixed to the top-piece of the case.



FIG. 3. Portable Case for the Nests.

Holes are bored in both sides of the case for the inlet of air to the enclosed nests.

A handle placed lengthwise on the top of the case permits its convenient carriage. When its four compartments are filled with

nests, its weight is less than sixteen pounds. Ants have made long journeys in my portable nests, with no grave disturbance of their domestic arrangements.<sup>1</sup>

When preparing the nests for a journey, tapes are tied around them, so as to hold the roof-panes securely in position, and bits of wadding are so inserted as to prevent their displacement in the case. Four of the A nests, sixteen of the D nests, or a selection from among the A, B, C and D nests may be carried in the case.

Before constructing my ant-nests, I made and used those of the Lubbock and of the Janet patterns, both much older than my own. The Lubbock nest, holding the ants on an island by a moat filled with water, is not portable; and whenever the pane of glass, covering the layer of earth over the island, needs to be cleaned, there must be a disturbance of the domestic interests of the ants. But the base of the Lubbock nest is a valuable adjunct when the ants are to be housed in my nests. It consists of a square or oblong block of wood, about two inches or five centimeters thick, with a channel grooved to half the thickness of the wood at a halfinch from its edge all around. When the channel, which is an inch or more in width, is filled with water, the island thus formed serves well for the temporary confinement of ants. The ants are brought, as Janet suggested, from their wild nests in little bags permeable by air, or in jars whose mouths are covered by gauze. The contents of the bag or jar are deposited thinly upon the island; a piece of glass covered by blotting paper and raised slightly above the general surface is laid over some portion of the area; and the ants, within a few hours, gather the young underneath the darkened glass. Their progress in their work is made visible by an instant's lifting of the blotting paper. Selections from the total capture may be made for removal to the glass nests. My nests of earlier construction, like the Janet nests, had an aperture in the wall through which the ants could themselves transport their young from the earth into the glass nest. But I have found it expedient to personally make selection from the total capture rather than to allow the ants to bring their whole community into the glass nest.

<sup>1</sup> The photographs with which this paper is illustrated were very kindly made for me by Mr. J. G. Hubbard and Dr. O. S. Strong.

Forel's method of making, upon a table, a stockade of dry plaster of Paris, to prevent the escape of the ants deposited within it, serves well when large colonies are dealt with. But ants have high regard for personal cleanliness and are discomforted by the adhering dust which punishes their effort to escape over this stockade. The Lubbock island renders clean stock.

The Janet nest, a series of four pits in porous stone, cement or stucco, with water in the pit at the end opposite the food-pit, proved that the ants may live healthfully without earth ; showed the practical value of more than one compartment in the artificial nest ; and gave an excellent background for viewing the ants. But the Janet nest is cumbrous and weighty ; and its food room becomes quickly mouldy in hot weather.

The glass nests are constructed at less expense than are those of either the Lubbock or the Janet pattern ; they are easily kept clean, and the small space which they occupy, with their very light weight, greatly facilitates the bringing of the ants under close observation.

THE MARINE BIOLOGICAL LABORATORY OF WOODS HOLL, MASS.,  
July, 1904.